The shape of the market area of tourist sites and the influencing factors

観光サイトの市場圏の形状とその要因について

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様々な情勢の下において、観光サイト間の競争が激化することが予想される。そのような競争の中で観光サイトが持続していくためには、当サイトの市場圏の概況について把握する必要がある。そこで、本研究では、古典的な市場地域モデルをベースに、観光サイトの市場圏がどのような形状になるのかについて再確認すると同時に、観光サイトでの消費費用、そこでの不効用・効用、交通費用、交通時間に関する費用、交通機関への不効用・効用を明示化することで、それらとの関連性についての分析を行った。その結果、上記要素が観光市場圏の形状にある種の影響を及ぼすことが確認できた。

Keyword: travel related costs, tourist site, utility/disutility, travel time, market area

1. Introduction

The economic ripple effect and job creation effect from tourism reaches various areas such as retail, food-service, hotel, culture, nature and transportation (Ministry of Land, Infrastructure, Transport and Tourism, 2015; Sinclair and Stabler, 1997). Leisure and consumption activities of tourism can also raise the utility and wellbeing (Yasumira et al., 2011). In this way, tourism plays an important role in society.

Tourism is thought to play an increasingly active role in our lives in the future, affected by social trends such as the development of information technologies, the improvement of infrastructures, and the increase in leisure time (Kuroda, 2012; Ministry of Internal Affairs and Communications, 2015). As a result, competitiveness between tourist sites is expected to become severe.

Therefore, in order to sustain the tourist sites, it will be necessary to understand the framework concerning the market area of the tourist sites. Thus, based on the classical market area models (e.g. Fetter, 1924; Godlund, 1956; Hyson and Hyson, 1950), the first purpose of this research is to confirm the shape of the boundary line between two tourist sites, by applying the factors of tourism. In this paper, it is assumed that the two tourist sites examined are in a competitive relationship and thus, consumers are not able to visit both sites at the same time. The second purpose of this research is to examine the factors of tourism that will affect the shape of the boundary line between the two tourist sites. In this research, the factors which will have an impact on the shape of the boundary line, will be classified into two. The first factor is about the cost at the tourist sites. The average expenditure by consumers to experience the tourist site is added with the cost from the average disutility from the tourist site relative to the average utility from the tourist site. Here, we call this the burden of tourist sites. The second factor is related to travel to the tourist sites, which we will refer to as travel related burden. This is represented by the sum of the average transportation fees per distance; the opportunity cost of the time consumed to travel per distance; the disutility from travel means per distance divided by the utility gained from the transportation means per distance which is then transferred into costs.

Therefore, considering these factors, this research modified the classical market area model and analyses the shape of the boundary line of market gained by tourist sites and the relationship between the shape of the boundary line of the market and these factors. One condition of the analysis is that it assumes that complete information concerning the markets and utility is available.

2. Three cases of market areas of the tourist sites

2-1. Case of symmetric tourist sites concerning the burdens to the consumers to experience the tourist site and the travel related

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burdens per distance

This section examines the case of two tourist sites that are symmetric in the burdens of the tourist sites and the travel related burdens per distance. Since the burdens to experience the tourist sites are symmetric, the relationship of the costs can be represented as follows.

$$E^A + z_s^A(X^A/Y^A) = E^B + z_s^B(X^B/Y^B) \quad (1)$$

Here, *E* represents the average expenditure by consumers at the tourist site. For example, admission fees to view cultural artifacts, entrance fees of gardens, and cost of food in cafes and restaurants are included in the costs. *X* represents the average disutility received at a tourist site and *Y* represents the average utility gained at the tourist site. z_s denotes the coefficient which translates the disutility relative to the utility into cost.

As it is assumed that the travel related burden per distance are equal between each tourist sites, the following equation is obtained.

$$f^A + z_t^A \frac{1}{v^A} + z_u^A \frac{1}{v^A}(R^A/W^A) = f^B + z_t^B \frac{1}{v^B} + z_u^B \frac{1}{v^B}(R^B/W^B) = F \quad (2)$$

f denotes the average transportation fee per distance between a departure point and a tourist site. *v* is the average speed of travel between a departure point and a tourist site. z_t refers to the opportunity cost per hour. *R* represents the cost corresponding to the average disutility for transportation facilities per hour between a departure point and a tourist site. *W* represents the average utility of the transportation per hour. z_u refers to the coefficient to translate the disutility per hour relative to the utility per hour into cost. $\overline{AC}$ denotes the distance between point *C* and tourist site *A*. $\overline{BC}$ is the distance between point *C* and tourist site *B*.

The total burden to consumers visiting the tourist site is the sum of the burden of the tourist site and the travel related burden. Therefore, the total burden to consumers when making a round trip to tourist site *A* from point C is as follows.

$$(E^A + z_s^A(X^A/Y^A)) + 2(f^A\overline{AC} + z_t^A \frac{\overline{AC}}{v^A} + \frac{\overline{AC}}{v^A} z_u^A(R^A/W^A)) \quad (3)$$

On the other hand, the total burden to consumers when making a round trip to the tourist site *B* from point C is as follows.

$$(E^B + z_s^B(X^B/Y^B)) + 2(f^B\overline{BC} + z_t^B \frac{\overline{BC}}{v^B} + \frac{\overline{BC}}{v^B} z_u^B(R^B/W^B)) \quad (4)$$

The point where the above costs (3) is equal to the above costs (4), in other words, where the sum of the burden at the tourist site A to consumers and the transportation related burden when making a round trip to the tourist site *A* equals the sum of the burden at tourist site *B* and the transportation related burden when making a round trip to the tourist site *B*, becomes the border point of these tourist sites. Therefore, the following equation is derived.

$$(E^A + z_s^A(X^A/Y^A)) + 2(f^A\overline{AC} + z_t^A \frac{\overline{AC}}{v^A} + \frac{\overline{AC}}{v^A} z_u^A(R^A/W^A)) = (E^B + z_s^B(X^B/Y^B)) + 2(f^B\overline{BC} + z_t^B \frac{\overline{BC}}{v^B} + \frac{\overline{BC}}{v^B} z_u^B(R^B/W^B)) \quad (5)$$

By substituting (1) and (2) into the above equation (5) and rewriting it, the following equation is derived.

$$\overline{AC} = \overline{BC} \quad (6)$$

From the result of equation (6), we can confirm that the perpendicular bisector between tourist site *A* and tourist site *B* is locus of point *C*, and that the locus is the border between tourist site *A* and tourist site *B*.

2-2. Case of asymmetry between the burdens to consumers to experience the tourist site but symmetry between the travel related burdens per distance

This section examines the case of asymmetry in the burdens to consumers to experience tourist site *A* and tourist site *B*, but symmetry between the travel related burdens per distance to travel to each tourist site *A* and tourist site *B*. Therefore, the relation between the burden to experience tourist site *A* and the burden to experience tourist site *B* are as follows. Here we will only examine the case where the burden at tourist site *A* is larger than the burden at tourist site *B*, since the opposite case will have a symmetrical result.

$$E^A + z_s^A(X^A/Y^A) > E^B + z_s^B(X^B/Y^B \quad (7)$$

Next, concerning the travel related burden, since we assume that the travel related burden per distance between point *C* and tourist

site *A* is the same as the travel related burden per distance between point *C* and tourist site *B*, these costs are the same as equation (2).

As in the case of section 2-1, the border point of these tourist sites are where the total burden for consumers for each tourist site, which is the sum of the burden to experience the tourist site and the travel related burden when making a round trip to the tourist site, are equal. Therefore, by substituting (2) into equation (5) and reorganizing it, the following equation is derived.

$$\overline{BC} - \overline{AC} = ((E^A + z_s^A(X^A/Y^A)) - (E^B + z_s^B(X^B/Y^B)))/2F \tag{8}$$

From equation (8), we can confirm that the boundary line between the markets of tourist site *A* and tourist site *B* is the locus of hyperbola where tourist site *A* is the focus. When the burden to experience tourist site *A* is larger than the burden to experience tourist site *B* and the larger the difference is, ceteris paribus, the locus of hyperbola which is closer to tourist site *A* is the boundary line of the market between tourist site *A* and tourist site *B*.

2-3. Case of symmetry between the burdens to experience the tourist site but asymmetry between the travel related burdens per distance

This section analyses the case of symmetry between the burden to experience each tourist site but asymmetry in the travel related burden per distance to travel to each tourist site.

As this section assumes that burden to experience tourist site *A* is the same as the burden to experience tourist site *B*, by substituting (1) into equation (5) and rewriting it, the following equation is derived.

$$\frac{\overline{AC}}{\overline{BC}} = \left(f^B + \frac{z_t^B + z_u^B(\frac{R^B}{W^B})}{v^B}\right) \Big/ \left(f^A + \frac{z_t^A + z_u^A(\frac{R^A}{W^A})}{v^A}\right). \tag{9}$$

On the other hand, with regards to point *D*, the following equation is derived.

$$(E^A + z_s^A(\frac{X^A}{Y^A})) + 2(f^A\overline{AD} + z_t^A\frac{\overline{AD}}{v^A} + z_u^A\frac{\overline{AD}}{v^A}(R^A/W^A) = (E^B + z_s^B(X^B/Y^B)) + 2(f^B\overline{BD} + z_t^B\frac{\overline{BD}}{v^B} + z_u^B\frac{\overline{BD}}{v^B}(R^B/W^B). \tag{10}$$

By substituting (1) into the above equation (10) and rewriting it, the following equation is introduced.

$$\frac{\overline{AD}}{\overline{BD}} = \left(f^B + \frac{z_t^B + z_u^B(\frac{R^B}{W^B})}{v^B}\right) \Big/ \left(f^A + \frac{z_t^A + z_u^A(\frac{R^A}{W^A})}{v^A}\right). \tag{11}$$

From results (9) and (11), the following equation is obtained.

$$\frac{\overline{AC}}{\overline{BC}} = \frac{\overline{AD}}{\overline{BD}} \tag{12}$$

From equation (12), we find that the internal ratio is equal to the external ratio. In this case, it confirms that the locus of Apollonius circumference located around tourist site *A*, is the boundary line between tourist site *A* and tourist site *B*. Moreover, we can find that the locus of this Apollonius circumference is smaller if the travel related burden per distance to tourist site *A* is larger than the travel related burden to tourist site *B* and the larger the difference is.

3. Conclusion

Tourism is expected to play a further role in our lives in the future, affected by social trends such as the development of information technologies, improvement of infrastructures, and the increase in leisure time. As a result, the competitive landscape between tourist sites is expected to become severe.

This paper examined the shape of the boundary between the market area of tourist sites in competition and the influencing factors. The classical market area model is applied and the burden to consumers to experience the tourist sites and the travel related burden

per distance is added to the framework.

The main result in the case where there is asymmetry between the burdens to experience the tourist sites but symmetry concerning the travel related burdens per distance, found that when the burden to consumers to experience tourist site *A* is larger than the burden for consumers to experience tourist site *B*, the hyperbola with site *A* as the focus will be the boundary between the market areas of tourist site *A* and tourist site *B*. Furthermore, the larger the difference between these burdens to experience the tourist sites is, ceteris paribus, the locus of hyperbola, the boundary line of the market between tourist site *A* and tourist site *B*, will be closer to tourist site A. Accordingly, tourist site *A* needs to make various improvements to reduce the total burden to consumers, by supporting through subsidies and other means, the private goods/services which have public or universal value; reduce the disutility experienced by consumers such as by reducing congestion and improve sanitation; and improve the utility experienced.

In the case where there is symmetry between the burdens to experience the tourist sites but asymmetry in the travel related burdens per distance, the Apollonius circumference is the locus of the boundary line between both tourist sites. For example, in the case that the locus is the Apollonius circumference located around tourist site *A*, the size of the market area represented by the circle for tourist site *A* is smaller when the travel related burden per distance to consumers to travel to site *A* is larger than the travel related burden per distance to travel to site *B* and the difference is greater. Thus, in this case, it will be necessary for site *A* to cooperate with the transportation facilities, to encourage policies to reduce real travel related costs per distance for consumers. It will be important to include such cooperation as to reduce the travel cost per distance, improve the speed of travel, enhance the consumers' utility by improving congestion, sanitation, safety, comfort, and other transportation services.

The results achieved from the above model may provide a basic framework for future improvements to manage a competitive tourist site.

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